DRAFT ETMS System Requirements

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Requirements Described:	Multiple Flights Active with Same Call Sign
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1.0 Scope

This is the system requirements document for the added functionality of accurately displaying and tracking more than one active aircraft with the same call sign. The purpose of this document is to define and reach agreement on the system level requirements for the multiple active flights algorithms.

2.0 Background

The ETMS, from its very inception, had an implicit requirement that there can only be one flight in an active state for each call sign. The call sign is the "flight-id," e.g. COA3430. The FTM application implemented this by maintaining an active table and when, in the rare circumstances that there were simultaneous reports from differing flights, it would switch entries in the active table and jump geographically on the TSD.

The large numbers of ETMS data sources, both national and international, the longer duration of the additional international flights, and the flight operations of specific United States carriers now cause the once rare event of multiple active flights to be more common. This is cause for concern with FDB flight correlations, reports being issued and the previously described visual anomalies.

The system enhancements specified below will allow the seamless operation of multiple aircraft with the same call sign to be active within the ETMS.

3.0 Functional Requirements

The boldface, numbered items below are the requirements. Parenthetical or un-bolded passages are included for clarity but are not part of the requirements.

Note: The phrase "*Shall not be modified by this requirement*" implies that the specified item will not cause a coding modification. This means that the existing code to handle the situation will suffice and will not be modified.

1) The ETMS FDB shall correlate simultaneous active flights having identical call signs with unique flight entries.

This requirement means that the FDB will be able to differentiate events from two active flights and insert them into their own flight entries within the FDB database. The following list contains each input message type and the processing that will be required for each message type to support this requirement.

a) The FS (OAG scheduled flight) message processing:

(1) **Shall not be modified for this functionality**

A scheduled flight plan will have no impact since it does not concern itself with active flights.

b) The FZ (NAS proposed flight plan) message processing:

A flight plan can be in three different modes:
A proposed flight plan (a "P" prefix on field 07) denotes that the flight will depart at a later time.
An enroute flight plan (a "E" prefix on field 07) denotes that the flight is already in the air and will enter controlled airspace at the specified time and place.
A combined FZ/DZ filing (a "D" prefix on field 07) denotes that the flight became active at the specified time and place.

(1) **Shall not be modified by this requirement unless it is for an active flight or would activate a flight. For either case, active flight** ("E" on field 07**) or an activate flight** (implied DZ by a "D" on field 07):
- **(i) Will attempt to match the FZ to the correct record as is currently being done (largely done on CID, departure/arrival airport information, and times).**
- **(ii) Will be modified so that other active records with the same flight-id can be left in "active" status.**

c) The DZ (NAS Departure Information) message processing:

A departure message can be in two different modes:
An enroute flight plan (a "E" prefix on field 07) denotes that the flight is already in the air and became NAS controlled at the specified time and place.
A departure filing (a "D" prefix on field 07) denotes that the flight became active at the specified time and place.

(1) DZ matching shall not be modified since the system currently attempts to match all DZs to the correct record.
(2) DZ code will be modifed so that other active entries with the same flight-id can be left in "active" status.

d) The AF (NAS Flight Amendment) message processing:

Note that Non NAS data providers issue AF messages without a CID field. The following rules will still suffice since they eventually default to a non-active flight for correlation.

In some cases, when the prefix on a field 07 modification is a "E," the Flight Amendment message will be logically considered to be an enroute flight plan. This will cause a non active flight to be activated.

In some cases, when the prefix on a field 07 modification is a "D," the Flight Amendment message will be logically considered to be an combined FZ/DZ flight plan. This will cause a non active flight to be activated.

(1) AF matching shall not be modified since the system currently attempts to match all AFs to the correct record.
(2) **Active AF code will be modifed so that other active entries with the same flight-id can be left in "active" status.**

e) The TZ (NAS Track Data Block) message processing: These messages do not contain departure/arrival airport information, so matching will largely be done based first on flight-id and then by this sequence of checks:
(1) Try to match to an already active entry based on CID (if one is present).
(2) Try to match to an already active entry whose last TZ is no more than 15 minutes old based on a distance-flown/time comparison to expected airspeed.
(3) Try to match to an already active entry whose last TZ is more than 15 minutes old based on comparing the TZ position to the expected route of the flight.
(4) Try to match to a proposed entry based on comparing the TZ time to the predicted departure and arrival times for the proposed entry as well as comparing the TZ position against the expected route of the flight.
(5) Try to match to a "completed" flight.
(6) **Modify the code so that other active entries with the same flight-id can be left in "active" status.**

f) The UZ (NAS Update Information) message processing:
(1) UZ matching shall not be modified since the system currently attempts to match all UZs to the correct record.
(2) UZ processing code will be modifed so that other active entries with the same flight-id can be left in "active" status.

g) The AZ (NAS Arrival Information) message processing:
(1) AZ matching shall not be modified since the system currently attempts to match all AZs to the correct record.

h) The TO (ETMS Oceanic Position) message processing:

(1) Shall be handled similarly to TZ messages.

i) The RZ (NAS Cancellation) message processing:
(1) RZ matching shall not be modified since the system currently attempts to match all RZs to the correct record.

j) The RS (OAG cancel) message processing:
(1) **Shall not be modified by this requirement**

k) The FC (CDM Flight Create) message processing:
(1) **Shall not be modified by this requirement**

l) The FX (CDM Flight Cancel) message processing:
(1) **Shall not be modified by this requirement**

m) The FM (CDM Flight Modify) message processing:
(1) **Shall not be modified by this requirement**

2) The ETMS TDB process shall be modified as follows to support multiple active flights with the same call signs:

a) **No Changes needed**

3) The ETMS ListServer process shall be modified as follows:

a) **TBD**

4) The ETMS FTM process shall be modified as follows to support multiple active flights with the same call signs:

a) **Allow duplicate call signs in the active table (each with its own unique data)**
b) **Correlate FDB flight indices correctly on ORIG data events**
c) **Extract the correct flight information for duplicate call signs on List requests**
d) **Write duplicated call signs, each with its unique active data, into the MAP files**
e) **TBD**

5) The ETMS DACS/TSD process shall be modified as follows to support multiple active flights with the same call signs:

a) **Uniquely display all flights in the FTM MAP file (even those with the same call sign)**
b) Uniquely display the "flight history" marks for each flight (aka footprints)
c) Display all flight entries for a specific flight display request
d) TBD

4.0 Performance Requirements

Accuracy Requirements

4.1 TZ must correlate to the correct flight.
4.2 TSD must display the correct flights.

Speed Requirements

4.3 FDB/FTM must not process a TZ any slower than it is currently being processed, within 0.5%.

Recoverability Requirements

4.4 N/A

Reliability Requirements

4.5 N/A

5.0 ISSUES

N/A

6.0 Assumptions

6.1 Duplicate flights can not reside within the same NAS center.
6.2 Flights with the same flight-id will not be flying in close proximity to each other (on the order of several hundred nautical miles.